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(11)

(54) SULFINYL COMPOUNDS AND PROCESSES FOR PREPARING SAME

(71) We, KAO SOAP COMPANY LIMITED, a Japanese Company, of 1,1-chome, Nihonbashi-Kayabacho, Chuo-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following

The present invention relates to novel compounds which have an antibiotic function. More specifically, the present invention relates to derivatives of acrylic acid,

which derivatives have a sulfinyl group at the β -position of the acid.

Many problems arise when conventional antibiotic chemicals are used. A primary problem is that each of the known antibiotic chemicals can only be applied to a small group of systems or species of micro-organisms. Under the present circumstances, it is therefore necessary to subject a number of available antibiotic chemicals to various tests in order to select the specific chemical which is suited for application to the particular system or species of micro-organisms. Although antibiotic chemicals of the phenol system have been widely used, this kind of chemical, in general, has only a narrow spectrum of antibiotic activity and it must be used at a high concentration. Antibiotic chemicals of the halogen-substituted aromatic compound system, which are another kind of widely used antibiotic chemical, tend to accumulate in the natural world without being decomposed, which causes another kind of problem. It is also known that invert soaps exert remarkable antibiotic activities at low concentrations. However, it is difficult to apply invert soaps to a system in which it is desired to avoid lathering of the soaps or to an anionic emulsion system, because the invert soaps form insoluble complexes with such systems.

The present invention has been developed as a result of our vigorous efforts to solve the aforementioned problems.

The object of the present invention is to provide compounds which have an antibiotic function and which can be widely applied to various uses.

The present invention provides compounds having the following formula (1):



In the above formula, R is alkyl or alkenyl having 1 to 20 carbon atoms, or aryl 30 30 such as aryl having 6 to 10 carbon atoms; and X is -COY, wherein Y is (1) -O(CH₂CH₂O)_mH, wherein m is zero or an integer from 1 to 12, or (2) -OM, wherein M is an alkali metal, an alkaline earth metal or NH4, or (3) —O(CH₂CH₂O)_mR₁, wherein m is as defined above and R₁ is alkyl having 1 to 20 carbon atoms, or (4) a hydroxyl-substituted alkoxy group obtained by removing one 35 35 hydrogen atom from one hydroxyl group of a polyhydric aliphatic alochol or



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or (5) —NR'R", wherein R' is selected from hydrogen, alkyl having 1 to 20 carbon atoms, and hydroxyalkyl having 2 to 6 carbon atoms, and R" is selected from hydrogen, alkyl having 1 to 20 carbon atoms, and substituted alkyl having 2 to 6 carbon atoms wherein the substituent is selected from hydroxyl and a sulfo group in the form of a salt (—SO₃M₁, wherein M₁ is an alkali metal).

Preferably R is a straight chain alkyl or alkenyl group having 3 to 18 carbon atoms; Y is preferably selected from alkoxy having 1 to 3 carbon atoms, alkoxyethoxy having 1 to 3 carbon atoms in the alkyl moiety —O(CH₂CH₂O)₂R' where R' is alkyl having 1 to 3 carbon atoms,

$$-O(CH_2CH_2O)_mH (m=1 \text{ to } 12),$$

and where Y is —NR'R", R' is preferably selected from hydrogen, alkyl having 1 to 3 carbon atoms, and hydroxyalkyl group having 2 or 3 carbon atoms; and R" is selected from hydrogen, alkyl having 1 to 3 carbon atoms, hydroxyalkyl having 2 or 3 carbon atoms, and substituted alkyl group having 2 or 3 carbon atoms and wherein the substitutent is —SO₃M wherein M is an alkali metal.

The compounds having the above formula (1) can be obtained by oxidizing compounds having the formula (2) with an inorganic or organic peroxide.

$$RS-CH=CHX$$
 (2)

wherein R and X in the formula (2) are the same as defined hereinabove with reference to the formula (1).

The formula (2) starting compounds and their preparation are disclosed and claimed in British Patent Application No. 26353/76 (Serial No. 1 528 853).

Examples of inorganic peroxides usable in the method described above include hydrogen peroxide and sodium metaperiodate. As suitable organic peroxides, there are mentioned m-chloro-perbenzoic acid, perbenzoic acid and peracetic acid.

It is preferred to use 1.1 to 1.5 moles of the peroxide per 1 mole of the starting compound of formula (2).

The solvent used in the reaction mixture and the time period for carrying out the reaction can be determined depending on the kind of oxidizing agent that is used. In general, the oxidizing reaction of the invention is carried out in a solvent such as a hydrated alcohol, acetic acid or a chlorinated hydrocarbon such as chloroform or methylene chloride, at a temperature of -10° C to 80°C. More specifically, when sodium metaperiodate is used, the reaction is carried out in a hydrated alcohol at 0° to 25°C; when hydrogen peroxide is used, the reaction is carried out in a hydrated alcohol at 60° to 70°C or in acetic acid at 30° to 80°C; when m-chloro-perbenzoic acid or perbenzoic acid is used, the reaction is carried out in a chlorinated hydrocarbon such as chloroform or methylene chloride at 0° to 25°C; and when peracetic acid is used, the reaction is carried out in acetic acid at -10° to 0°C.

The compounds having the formula (2) which are used as starting materials for preparing the compounds of the present invention having the formula (1), can be prepared by the method of reacting mercaptans having the formula RSH (3) with acetylene-monocarboxylic acid in an aqueous solution of an alkali metal hydroxide to form compounds having the formula (4):

RS-CH=CH-COOM

(4)

wherein R is as defined above and M is hydrogen or alkali metal. The compounds obtained by esterifying or forming amides of the compounds having the formula (4) can also be used as starting materials for preparing the compounds of the present invention.

Among the groups represented by —COY for X in the compounds of the formula (2) and used as starting materials for the compounds of the invention, hydroxyl-substituted alkoxy groups are formed by removing one hydrogen atom from one hydroxyl group of a polyfunctional alcohol, especially a saturated, aliphatic or alicyclic alcohol having from 2 to 10 carbon atoms. The cyclic groups

having ether bonds located in the ring, can also be used. Such alkoxy groups are formed by removing one hydrogen atom from one hydroxyl group of a polyfunctional alcohol such as ethylene glycol, propylene glycol, glycerin, erythritol, pentaerythritol, xylitol, sorbitol, mannitol, diglycerin, dipentaerythritol, xylitan, sorbitan, mannitan and polyethylene glycols.

The compounds of the present invention have the formula (1) are used for germicides or sterilizers other than for medical uses, and also as antifungal agents, and antiseptics. The compounds of the present invention prevent growth of Gram positive organisms such as Staphylococcus aureus and Bacillus subtilis which are representative micro-organisms that cause various injuries under normal living environments, and also prevent growth of the Gram negative organisms such as Escherichia coli, Proteus vulgaris and Pseudomonas including Pseudomonas aeruginosa which is well known as a representative putrefactive bacterium. The compounds of the invention also have the function of preventing growth of various molds such as Penicillium, Aspergillus and Sozopus and are further effective against yeasts belonging to the Candida genus which causes moniliasis.

The compounds of the present invention can be changed in their physiochemical properties and their antibiotic activities by introducing different groups R and X into

yields of the reactions are shown in Table 1, and the properties of the products are

shown in Table 2.

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TABLE 1
Preparation of esters of \(\beta\)-mercapto acrylic acids

Yield based on aercapto acrylic acid	76	89	84	88	78	80
Product	C,, H,, S-CH - CH-COOCH,	0н 0н 	Сг2H25SCH-CHC00-CH270	HO HO HO	C,, H,, SCH - CHC00(CH, CH,0), CH,	CH, SCH - CHC00CH,
Reaction period (hr)	٧٠	v	8		S	5
Reaction Reaction temp. period	80	110	110		80	08
Solvent	benzene (400m)	toluene (400m)	toluene (400m)		benzene (400m)	benzene (400m)
Quantity of the catalyst	5m1	10 g	10 g		5m1	Sml
f Cataly st	H, 50,	Amberlite* IR-120	Amberlite IR120		н, 80,	H ₂ SO ₄
Quantity of alcohol in mol added to 0.30 mol of mercapto acrylic acrylic acid	3.0	2.0	3.0 20H		2.0	3.0
Radical of alcohol deprived of one OH group	GH,	0H-0H - -СH, CH-СН,	он сн <u>,</u> -(-сн-), сн,он		–(CH, CH,0), CH,	СН,
R in β- mercapto acrylic acid	C ₁₂ H ₂₈					.CH ₃

* 'Amberlite' is a Regd. Trade Mark.

TABLE 1 (Continued)

				TABI	TABLE 1 (Continued)	tinued)			
			Preparation os esters of eta -mercapto acrylic acids	os esters	of A-merca	pto acrylic	c acids		
R in β- mercapto acrylic acid	Radical of alcohol deprived of one OH group	Quantity of alcohol in mol added to 0:30 mol of ancrepto acrepto acrylic acid	f Cataly st	Quantity of the catalyst	Solvent	Reaction Reaction temp. period (°C) (hr)	Reactio period (hr)	n Product	Yield based on mercapto acrylic acid
	он он - -Сн, сн-сн,	2.0	Amberlite IR—120	10 g	toluene (400m)	110	5	0H 0H CH ₂ SCH = CHC00CH ₂ CH-CH ₂	76
	он -сн, ←сн, сн, он	3.0	Amberlite IR-120	10 8	toluene (400m)	110	'n	CH35CH-CHCOOCH2-CH OH	33 33
	(CH, CH,0), CH,	2.0	H, SO,	Sml	benzene (400m)	80	~	H	89
C20H41	, CH,	3.0	H, SO,	Sml	benzene (400m)	80	Ŋ	C ₂₀ H ₄₁ SCH = CHC00CH,	7.5
	он он -Сн ₂ -Сн-Сн ₂	2.0	Amberlite IR-120	10 g	toluene (490m)	110	S	OH OH	09

TABLE 1 (Continued)

	Yield based on mercapto acrylic acid	40	45	82	78	89	38	36
	Product	но но но но но гото на гото н	HO H	C20H4, SCH - CHCOO(CH2 CH20), CH3	C ₁₈ H ₃₅ SCH = CHCOOCH ₃	он он С _{1,} Н _{3,} SCH - CHCOOCH ₂ CH - CH ₂	C _{IR} H ₃₅ SCH=CHCOOCH2	0H HO
c acids	Reaction period (hr)	ν.		\$	5	8	٧	
inued) pto acryli	Reaction temp.	110	-	80	80	110	110	
IABLE I (Continued) ters of B-mercapto ac	Solvent	toluene (400m)		benzene (400m)	benzene (400m)	toluëne (400m)	toluene (400m)	
I ABLI of esters o	Quantity of the catalyst	10 g		5ml	Sml	10 10	10 g	
Preparation of esters of B-mercapto acrylic acids	Catalyst	Amberlite IR-120		н, 504	н, 50,	Amberlite IR-120	Amberlite IR-120	
	Quantity of alcohol in mol added to 0.30 mol of mercapto acrylic acid	3.0		2.0	3.0	2.0	3.0	
	Radical of alcohol deprived of one OH group	он - - - -		-(CH, CH,0), CH,	"В	он он Сн, снСн,	HO HO	-Cn, -(-Cn -4-Cn, On
	R in Bmercapto acrylic acid				Oleyl (C ₁₀ H ₁₅)			

TABLE 1 (Continued)

	Yjeld based on mercapto acrylic acid	72	80	78	53	30	69
	Product	C ₁₆ H _{#8} SCH = CHC00(CH ₂ CH ₂ 0) ₂ CH ₃	PhSCH = CHCOOCH,	он он PhSCH - CHCOOCH, CH-CH,	PhSGH=CHC00CH2POH	Но	PhSCH - CHC00(CH, CH,0), CH,
c acds	Reaction period (hr)	\$	· •	` v s	8		v
pto acryli	Reaction Reaction temp. period	80	80	110	110		80
ıf β-merca	Solvent	benzene (400m)	benzene (400m)	toluene (400m)	toluene (400m)		benzene (400m)
of esters o	Quantity of the catalyst	5ml.	Sml	10 g	10 g		Sml
Preparation of esters of eta -mercapto acrylic acds	Catalyst	H2 SO4	H2 SO4	Amberlite IR—120	Amberlite IR-120		H, SO,
	Quantity of alcohol in mol added ro 0.30 mol of mercapto acrylic acrylic acid	2.0	3.0	2.0	3.0		2.0
	Radical of alcohol deprived of one OH group	–(CH ₂ CH ₂ 0) ₂ CH ₃	CH,) OH OH -CH, CH-CH,	OH; −CH; ←CH; CH; OH	·	-(CH, CH,0), CH,
	R in β- mercapto acrylic acid		Phenyl	0			

TABLE 2

		TABLE 2	~				
	Properties of	sters of <i>A</i> -merc	Properties of esters of B-mercapto acrylic acids				
Compound	Property	IR (cm-1)	NMR (CC1,, TMS, 8 ppm)	Result of elementary analysis found calcd C(%) H(%) C(%) H(%)	sult of eleme found C(%) H(%)	entary analys calcd C(%) H(%)	analysis d H (%)
C ₁₂ H ₃₅ S-CH - CH-C00CH ₃	mp. 48—50°C (from hexane)	17 10 (C=0)	7.55 (doublet, 1H, -CH-COO-), 5.80 (doublet, 1H, -S-CH-)	67.2	10.4	67.1	10.6
0Н ОН С ₁₂ H ₂₅ S-CH = CH-COOCH ₂ -CH-CH ₂	liquid	3300 (OH) 1715 (C =-O)	7.34 (doublet, 1H, = CH-COO-), 5.75 (doublet, 1H, -S-CH=)	62.3 10.3		62.4	10.0
но - сүгүгүү но - сүгүгүү	mp. 43–46°C (from hexane)	3300 (-0H) 1710 (C-0)	7.38 (doublet, IH, -CH-COO-), 5.81 (doublet, IH, -S-CH=)	62.4	9.3	62.7	9.5
но но но но но но-ко-ко-ко-ко-ко-ко-ко-ко-ко-ко-ко-ко-ко	mp. 45–47°C (from hexane)	3300 (-0H) 1713 (C=0)	7.39 (doublet, 1H, "CH_COO_), 5.78 (doublet, 1H, -S_CH =)	62.1	9.4	62.7	. 9.5
C ₁₁ H ₂₅ S-CH • CH-C00(CH ₂ CH ₂ 0), CH,	Iiqui d	3300 (-OH) 1710 (C-O)	7.40 (doublet, IH, = CH-COO-), 5.80 (doublet, IH, -S-CH=)	63.9	63.9 10.3 64.1	64.1	10.2
СН, SCH - СНСООСН,	liquid	1712 (C-0)	7.40 (doublet, IH, = CH_COO_), 5.92 (doublet, IH, -S_CH=)	45.3	5.9	45.5	6.1

		TABLE 2 (Cor	2 (Continued)				
	Properties of e	sters of <i>B</i> -merc	Properties of esters of B-mercapto acrylic acids				
Compound	Property	IR (cm ⁻¹)	NMR(CCi₄, TMS, δ ppm)	Result of ele found C (%) H (%)	of elen nd H (%)	nentary analy calcd C(%) H(%)	Result of elementary analysis found calcd C(%) H(%) C(%) H(%)
онон 	liquid	3300 (OH) 1715 (C-OL	7.36 (doublet, 1H, -CH-COO-), 5.70 (doublet, 1H, -S-CH-)	44.2	6.3	43.8	6.3
он ₃ scн = снсоосн ₂	liquid	3300 (OH) 1710 (C=0)	7.41 (doublet, 1H, - CH-COO-), 5.78 (doublet, 1H, -S-CH-)	45.6	6.0	45.5	6.1
CH 3 SCH-CHCOOCH2CH-CO-OH OH OH	liquid	3300 (OH) 1714 (C=0)	7.38 (doublet, 1H, -CH-COO-), 5.70 (doublet, 1H, -S-CH-)	45.3	6.0	6.0 45.5	6.1
CH, SCH - CHCOO(CH, CH, 0), CH,	liquid	1710 (C~O)	7.63 (doublet, 1H, =CH-COO-), 5.62 (doublet, 1H, -S-CH=)	49.3	7.1	49.1	7.3
C,0H41 SCH = CHCOOCH,	mp. 40.–41°C (from hexane)	1715 (C=0)	7.36 (doublet, 1H, *CH_COO_), 5.62 (doublet, 1H, -S_CH =)	72.1	11.3	72.3	11.6
0HOH C ₂₀ H ₄₁ SCH = CHCOOCH, CHCH ₂	mp. 43-44°C (from hexane)	3300 (OH) 1715 (C~O)	7.40 (doublet, 1H, "CH_COO_), 5.70 (doublet, 1H, -S_CH ")	68.4	10.8	68.1	11.0

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11				1,557	,225			11
		Result of elementary analysis found calcd C(%) H(%) C(%) H(%)	10.3	10.3	11.2	10.9	10.3	7.6
		entary analy: calcd C(%) H(%)	65.6	65.6	69.1	7.1.7	67.2	64.8
		f eleme nd H (%)	10.3	10.2 65.6	11.0	10.8	10.3	7.6
		Result of elem found C (%) H (%)	65.4	65.3	69.4	71.6	67.1	64.9
tinued)	Properties of esters of $oldsymbol{eta}$ -mercapto acrylic acids	NMR (CCI., TMS, 8 ppm)	7.42 (doublet, 1H, = CH_COO_), 5.36 (doublet, 1H, -S_CH =)	7.20 (doublet, IH, = CH-COO-), 5.72 (doublet, IH, -S-CH-)	7.38 (doublet, 1H, = CH_COO_), 5.62 (doublet, 1H, -S-CH =)	7.39 (doublet, 1H, -CH-COO-), 5.29 (doublet, 1H, -S-CH=)	7.62 (doublet, 1H, = CH-COO-), 5.43 (doublet, 1H, -S-CH=)	7.37 (doublet, 1H, "CH_COO—), 5.40 (doublet, 1H, -S-CH =)
TABLE 2 (Continued)	ters of <i>β</i> -merca	IR (cm ⁻¹)	3300 (OH) 1710 (C-0)	3300 (OH) 1714 (C-O)	17 10 (C=0)	1710 (C=0)	3300 (OH) 1710 (C=0)	3300 (OH) 1710 (C=0)
	Properties of es	Property	m.p. \$0-51°C (from hexane)	mp. 53–54°C (from hexane)	mp. 48-49°C (from hexane)	mp. 38–39°C (from hexane)	mp. 40–41°C (from hexane)	mp. 43–44°C (from hexane)
		Compound	но но он о	но но оно сисооси-2си со но он оно оно оно оно оно оно оно он	C20H4, SCH = CHC00(CH2 CH20)2 CH3	C ₁₈ H ₃₅ SCH = CHC00CH ₃	0НОН 	но н

ned)	
Continued	
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Z Z	
TABL	

		IABLE 2 (Continued)	(nanun				
	Properties of e	Properties of esters of $oldsymbol{eta}$ -mercapto acrylic acids	pto acrylic acids				
Compound	Property	IR(cm*¹)	NMR (CCl₄, TMS, δ ppm)	Resultof elementary analysis found calcd C(%) H(%) C(%) H(%)	iltof eleme found %) H (%)	entary analys calcd C(%) H(%)	nalysis d H (%)
PhSCH - CHC00(CH, CH, 0), CH,	liquid	1710 (C=0)	7.36 (doublet, 1H, -CH-COO-) 5.42 (doublet, 1H, -S-CH-)	59.7	6.4	59.6	6.4
	9.33 mol of sodium mets	Example 1. periodate (NaIO, d 200 ml of Me	Example 1. 0.33 mol of sodium metaperiodate (NaIO ₄) was dissolved in a mixed solvent aining 200 ml of H ₂ O and 200 ml of MeOH. 0.30 mol of h-lauryl-mercapto-	u			
5 acrylic mixtur The fi	c acid was added to the at 25°C for 24 hours filtrate was extracted with yield of 88%. The result	the formed sodii, the formed sodii diethyl ether. A so of the analyses	acrylic acid was added to the solution at room temperature. After agreating the mixture at 25°C for 24 hours, the formed sodium iodate (NaIO ₃) was filtered off. The filtrate was extracted with diethyl ether. A crystallized compound was obtained at a yield of 88%. The results of the analyses of the crystallized compound are set	n .			
forth 10 M	below. Melting Point: 62—65°C R (cm ⁻¹): 3300 (OH),	(from hexane)	forth below. Melting Point: 62—65°C (from hexane) IR (cm ⁻¹): 3300 (OH),	01	٠		
	1690	j					
	1050 (S=O)						
Z	NMR (CCI, TMS): 7.25 (doubler, 1H, =CH-COO-), 6.60 ppm (doublet, 1H,	(doublet, 1H, =C) ppm (doublet, 1H)	JH-COO-),				
	0=ģ	-CH=).					
15	Result of the elementary analysis:	malysis: calcd. 62.7 7.5		15			

From the results of the above analyses, the above crystallized compound was identified as having the following structural formula:

Example 2.

0.30 mol of β -lauryl-mercapto-acrylic acid was dissolved in 300 ml of EtOH.

0.50 mol of hydrogen peroxide in the form of a 30% aqueous solution was added and the mixture was heated at 70°C for 48 hours under agitation. The reaction mixture was extracted with diethyl ether to obtain a crystallized compound (yield: 68%). The results of the analytical tests confirmed that the crystallized compound obtained in this Example was the same as that of Example 1.

Example 3.

0.30 mol of β -lauryl-mercapto-acrylic acid was dissolved in 200 ml of chloroform. 0.33 mol of m-chloroperbenzoic acid in 100 ml of chloroform was added to the solution at 25°C. After agitating the mixture for 1 hour, the reaction product was extracted with diethyl ether. A crystallized compound was obtained (yield: 90%). The results of the analytical tests confirmed that the crystallized compound obtained in this Example was the same as that of Example 1.

Example 4.

0.30 mol of β-lauryl-mercapto-acrylic acid was dissolved in 200 ml of AcOH.

0.30 mol of peracetic acid was added to the solution at -10°C, and the mixture was agitated for 1 hour. Water was poured into the reaction mixture and the reaction product was extracted with diethyl ether. A crystallized compound was obtained (yield: 70%). The results of the analytical tests confirmed that the crystallized compound obtained in this Example was the same as that of Example 1.

Various β -sulfinyl-acrylic acids, esters thereof and amides thereof were synthesized. The reaction conditions and the yields are set forth in the following Table 7, and the properties of the obtained products are set forth in Table 8.

TABLE 7

Prepara Compound (2) R: X: -C ₁₂ H ₂₅ O -COH	Preparation of β-sulfinyl acrylic acids and esters and amides thereof Quantity of	Quantity of oxidizing agent in moles added to 0.30 mols of the Compound (2) 0.33 M 0.33 C	acids and esters and ty of ing added mols und Solvent P ₂ O(200ml) CHCl ₃ (300ml) AcOH(200ml)	Reaction period (hr.) 24 24 1	Reation (°C) (°C) 25 25 26 80	Xield (based on compound (2), (%) 88 88 90 90	Product 0
O == -C-OMe	NaIO₄ H₂ O₂ cl ⟨Cl ⟨Cl ⟨Cl ⟨Cl ⟨Cl ⟨Cl ⟨Cl	0.33	MeOH(200ml)— H ₂ 9(200ml) EtOH(300ml) CHCl ₃ (300ml) AcOH(200ml)	1 1 1	25 80 25 -10	79 52 92 64	O

TABLE 7 (Continued)

p.	TABLE 7 (Continued) Preparation of A-sulfinyl acrylic acids and esters and amides thereof	TABLE	TABLE 7 (Continued) acrylic acids and esters	and amides	thereof		
Compound (2) R: X:	Oxidizing agent	Quantity of oxidizing agent in moles added to 0.30 mols of the Compound (2)	of ed ols Solvent	Reaction period (hr.)	Reaction temp.	Yield (based on compound (2), (%)	Product
0 OH OH -COCH ₂ -CH-CH ₂	NaIO,	0.33	MeOH(200ml)— H ₂ O(200ml)	24	25	88	0=
	H, 0,	0:50	EtOH(300ml)	84	80	76	C ₁₁ H ₂₁ -S-CH ₂₂ OH OH CH-COOCH -CH-CH
0	NaIO,	0.33	MeOH(200ml)— H, O(200ml)	24	25	74	0
₹ ₹ 8-8-	H ₂ O ₂	0.50	Bt0H(300ml)	8	08	89	$C_{12}H_{28}-S-CH=$ $C_{12}H_{28}-S-CH=$ $C_{12}H_{28}-S-CH=$
0 - -	NaIO,	0.33	MeOH(200ml)— H ₂ O(200ml)	24	25	76	0:
	H, 0,	0.50	EtOH(300ml)	48	08	59	C ₁₂ H ₂₆ -S-CH = CH-COO(CH ₂ CH ₂ O) ₃ H

TABLE 7 (Continued)

	TABLE 7 (Continued) Preparation of \(\beta\)-sulfinyl acrylic acids and esters and amides thereof	TABLE finyl acrylic	TABLE 7 (Continued) I acrylic acids and esters	and amide	s thereof		
Compound (2) R: X:	Oxidizing agent	Quantity of oxidizing agent in moles added to 0.30 mols of the Compound (2)	of ed ols Solvent	Reaction period (hr.)	Reaction temp.	Yield (based on compound (2), (%)	Product
0=	NaIO,	0.33	MeOH(200ml)— H ₂ O(200ml)	24	25	83	c
-CO(CH ₂ CH ₂ O) ₂ Ме	CO C	0.33	CHC1, (300ml)	1	25	94	C ₁₂ H ₃₅ S-CH= CH-COO(CH ₂ CH ₂ O) ₂ M
O CH, CH, OH	NaIO,	0.33	MeOH(200ml)— H ₂ O(200ml)	24	25	70	0 C ₁₃ H ₂₄ S_CH =
СН, СН, ОН	#0 000 -CO	0.33	CHCI, (300ml)	-		8 2	CH-CON CH, CH, OH
O -CNHCH2 CH2 SO, Na	H2 02	0.50	MeOH(200ml)— H ₂ O(200ml)	84	08	16	0 C ₁₃ H ₂ ; S-CH= 0 CH-CNHCH ₂ CH ₂ SO ₃ N ₈

TABLE 7 (Continued)

_						31,44.	,						<u> 18</u>
		Product		0=	CH, SCH = CHCOOH				O ∦ CH, SCH = CHCOOOMe		0=	CH, SCH = OHOH	снсоосн, снсн,
		Yield t (based on compound (2), (%)	85	70	63	72	76	48	89	10	7.5	63	
	des thereof	n Reaction temp. (°C)	25	80	25	-10	25	80	25	-10	25	80	
	s and amid	Reaction period (hr.)	24	48	-	-	24	84	-	•	24	48	
TABLE 7 (Continued)	c acids and ester	of ded ols d Solvent	MeOH(200mI)— H ₂ O(200mI)	EtOH(300ml)	CHC1,(300m1)	AcOH(200ml)	MeOH(200m1)— H ₂ O(200m1)	EtOH(300m1)	CHCl ₃ (300ml)	AcOH(200ml)	MeOH(200ml)- H ₂ O(200ml)	EtOH(300ml)	
TABLE	inyl acryli	Quantity of oxidizing agent in moles added to 0.30 mols of the Compound (2)	0.33	0.50	0.33	0.30	0.33	0.50	0.33	0,30	0.33	0.50	
	Preparation of eta -sulfinyl acrylic acids and esters and amides thereof	Oxidizing agent	NaIO,	5		СН, СОООН	NaIO,	H, O,	CI (O)	СН, СОООН	NaIO.	H2 02	
		Compound (2)		0=	-C-0H		0=0	D WOO			HOHO 0		
		ä	CH,										

		TABLE	TABLE 7 (Continued)				
ď	Preparation of $oldsymbol{eta}$ -sulfinyl acrylic acids and esters and amides thereof	inyl acrylic	c acids and esters	and amide	s thereof		•
Compound (2) R: X:	Oxidizing agent	Quantity of oxidizing agent in moles added to 0.30 mols of the Compound (2)	of ed ols Solvent	Reaction period (hr.)	Reaction temp.	Yield (based on compound (2), (%)	Product
ου-ση- 0	NaiO,	0.33	MeOH(200ml) H ₂ O(200ml)	24	25	72	O
* ************************************	H, 0,	0.50	EtOH(300ml)	48	80	63	CHCOOCH ₂ OH
0 -CO(CH, CH,0),H	NalO,	0.33	MeOH(200ml)— H ₂ O(200ml)	24	25	73	0
	H,0,	0.50	EtOH(300ml)	48	80	56	СНСОО(СН, СН,О),Н
0 -C0(CH ₂ CH ₂ 0) ₂ CH ₃	Nai0,	0.33	MeOH(200mi)— H ₂ O(200ml)	24	25	80	O
	H0 000-	0.33	CHCl ₃ (300ml)	1	25	83	снсоо(сн, сн,о), сн,

TABLE 7 (Continued)

Preparation of Asulfinyl acrylic acids and esters and amides thereof

	3					100101		
	0 СН, СН, ОН	NaIO,	0.33	MeOH(200ml)— H ₂ O(200ml)	24	25	89	0=
	СН, СН, ОН	H0 000	0.33	CHCI, (300ml)	1	25	75	CHCON.
								сн, сн, он
	o -CNHCH, CH, 80, Na	H ₂ O ₂	0.50	MeOH(200ml) H, O(200ml)	48	08	73	O
					-			CHCONHCH, CH, SO, Na
C20H41	ć	NaIO,	0.33	MeOH(200m1)— H ₂ O(200m1)	24	25	8.5	
	-C-OH	H,0,	0.50	EtOH(300m1)	48	08	70	O = O
		#0000 0	0.33	CHC1, (300ml)		25	63	СНСООН
		СН,СОООН	0.30	AcOH(200ml)	1	-10	72	

TABLE 7 (Continued)

Preparation of $oldsymbol{eta}$ -sulfinyl acrylic acids and esters and amides thereof

Compound (2) R: X:	Oxidizing agent	Quantity of oxidizing agent in moles added to 0.30 mols of the Compound (2)	f ed ls Solvent	Reaction period (hr.)	Reaction temp.	Yield Reaction Reaction (based on period temp. compound (hr.) (°C) (2), (%)	Product
0	NaIO.	0.33	MeOH(200m1)— H ₂ O(200m1)	24	25	76	
-coch,	Н, 0,	0.50	EtOH(300ml)	48	80	49	0=
	HO 0000	0.33	CHCI, (300ml)	-	25	70	C ₂₀ H ₄ , SCH= CHCOOCH,
	сн, сооон	0.30	AcOH(200ml)	1	-10	89	
ноно о	NaIO,	0.33	MeOH(200ml)- H ₂ O(200ml)	24	25	7.5	0={
_C0CH, CHCH,	H, 0,	0.50	EtOH(300ml)	48	80	99	C ₂₀ H ₄₁ SCH = OH OH
							снсоосн, сн – сн,

		Product	O 	сисооси-2 он НО ИО
		Yield Yield Perion Reaction (based on compound (hr.) (°C) (2), (%)	89	09
	s thereof	Reaction temp.	25	80
	and amide	Reaction period (hr.)	24	8
TABLE 7 (Continued)	acids and esters	ed 11s Solvent	MeOH(200ml)— H ₂ O(200ml)	EtOH(300 ml)
TABLE	finyl acrylic	Quantity of oxidizing agent in moles added to 0.30 mols of the Compound (2)	0.33	0.50
	Preparation of A-sulfinyl acrylic acids and esters and amides thereof	Oxidizing agent	NaIO.	H, O,
		Compound (2)		5 -8 5

0 C ₂₀ H ₄₁ SCH =	СНСОО(СН, СН,0),Н	O	снсоо(сн, сн,о), сн,
7.2	55	80	89
25	80	25	25
24	48	24	-
MeOH(200ml)— H ₂ O(200ml)	0.50 EtOH(300ml)	MeOH(200ml)— H ₂ O(200m)	0.33 CHCl ₃ (300ml)
0.33	0.50	0.33	0.33
NaIO,	H, 0,	NaIO,	H0000
0 -CO(CH, CH,0), H		0 	

			TABLE	TABLE 7 (Continued)				
	Prep	aration of <i>\beta</i> sulf.	inyl acrylic	Preparation of $oldsymbol{eta}$ -sulfinyl acrylic acids and esters and amides thereof	and amide	s thereof		
.: ::	Compound (2) X:	Oxidizing agent	Quantity of oxidizing agent in moles added to 0.30 mols of the Compound (2)	of ed ols Solvent	Reaction period (hr.)	Reaction temp.	Yield (based on compound (2), (%)	Product
	0 СН, СН, ОН	NalO,	0.33	MeOH(200ml)— H ₂ O(200ml)	24	25	70	0
	сн, сн, он	но оф-	0.33	CHCl ₃ (300ml)	-	25	82 CI	CHCON CH, CH, OH
	o ∥ CNHCH2 CH2 SO3Na	H, 0,	0.50	MeOH(200ml)— H,O(200ml)	48	80	73 GF	0
Oleyl (C ₁₆ H ₃₅)		NaIO,	0.33	MeOH(200ml)— H ₂ O(200ml)	24	25	08	0 C ₁₆ H ₃₅ SCH ==
	-C-OH	H, 0, cl (CH, COOOH	0.50	EtOH(300ml) CHCl,(300ml) AcOH(200ml)	84 1 1	80 25 -10	65 63 70	СНСООН

Quantity of oxidizing agent in moles added to 0.30 mols Reaction Reaction (based on the Compound Solvent (hr.) (°C) (2), (%)	0.33 MeOH(200ml)	0.50 EtOH(300ml) 48 80 62)-сооон 0.33 CHCl ₃ (300ml) 1 25 53	C000H 0.30 AcOH(200ml) 1 -10 63	0.33 MeOH(200ml)— 24 25 73 0 H ₂ O(200ml) C H SCH	0.50 EtOH(300ml) 48 80 48 CHCO	• 0.33 McOH(200m1) - 24 25 72 O H ₂ O(200m1)	0.50 EtOH(300ml) 48 80 63	
Reacti period (hr.)		48		7	24	48	24	4	
	MeOH(200ml)— H ₂ O(200ml)	EtOH(300ml)	CHCl ₃ (300ml)	AcOH(200ml)	MeOH(200ml)— H ₂ O(200ml)	EtOH(300ml)	MeOH(200m1)— H ₂ O(200m1)	EtOH(300ml)	
Quantity oxidizing agent in moles add to 0.30 mc of the Compound (2)	0.33	0.50	0.33	0.30	0.33	0.50	0.33	0.50	
Oxidizing agent	NaIO.	H,0,	но ооо-	СН, СОООН	Nai0,	H ₂ O ₂	NaIO,	H, 0,	
Compound (2) R: X:	-COMe				о 		-α-α-ο	, }-डें। `क्ट	

TABLE 7 (Continued)

	Yield (based on compound (2), (%) Product	82 0	70 CHCOO(CH, CH, 0), H	63 0 	70 CHCOO(CH, CH, O), Me	72 0	CH, CH, OH
reof	Reaction temp.	25	80	25	25	25	25
amides the	Reaction period (hr.)	24	48	24	1	. 24	
and esters and	d s Solvent	MeOH(200ml)— H ₂ O(200ml)	EtOH(300ml)	MeOH(200ml) H ₂ O(200ml)	CHCl, (300ml)	MeOH(200ml)— H ₂ O(200ml)	CHCI, (300ml)
crylic acids	Quantity of oxidizing agent in moles added to 0.30 mols of the Compound (2)	0.33	0.50	0.33	0.33	0.33	0.33
Preparation of $oldsymbol{eta}$ -sulfinyl acrylic acids and esters and amides thereof	Oxidizing agent	NaIO,	H, 0,	NaIO,	H0 000-(O)	NaIO,	Сі
Prepa	Compound (2) R: X:	0 -C0(CH, CH,0), H		0 H)		O CH, CH, OH	сн, сн, он

	on nd Product	O 	0 PhSCH =	СНСООН			O ∥ PhSCH≃	снсоосн,
ē	Yield n (based on compound (2), (%)	43	63	70	82	65	82	62
les thereo	n Reaction temp. (°C)	80	25	80	25	-10	25	80
s and amid	Reaction period (hr.)	84	24	8	-	-	24	48
TABLE 7 (Continued)	f sd ls Solvent	MeOH(200ml) — H ₂ O(200ml)	MeOH'200ml) — H ₂ O(200ml)	EtOH(300ml)	CHČI, (300ml)	AcOH(200ml)	MeOH(200ml)— H ₂ O(200ml)	EtOH(300ml)
TABLE 7	Quantity of oxidizing agent in moles added to 0.30 mols of the Compound (2)	0.50	0.33	0.50	0.33	0.30	0.33	0.50
TABLE 7 (Continued) Preparation of eta -sulfinyl acrylic acids and esters and amides thereof	Oxidizing agent	Н, О,	NaIO	H,02	# 000 O	СН, СОООН	NalO,	H,0,
	Compound (2) R: X:	O -CNHCH, CH, SO, Na	Ph.	0 = (-(0))			O == COMe	

TABLE 7 (Continued)

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B-acrylic acids and esters and amides thereof
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Compound (2) R: X:	Oxidizing agent	Quantity of oxidizing agent in moles added to 0.30 moles of the Compound (2)	d es Solvent	Reaction period (hr.)		Yield Reaction (based on temp. compound (°C) (2), (%)	Product
	-00 00 0H	0.33	CHCl ₃ (300.nl)		25	85	
	СН, СОООН	0.30	AcOH(200ml)	+	-10	70	
O OHOH COCH2CHCH2	NaIO,	0.33	MeOH(200m1)— H,O(200m1)	24	25	76	0 Pasch=
	Н,0,	0.50	EtOH(300m1)	84	80	88 D	онон Снсоосн, снсн,
o.	Nai0,	0.33	MeOH(200ml) – H ₂ O(200ml)	24	25	89	0 PhSCH ≈
₹5 ₹5 ₹5	H ₂ O ₂	0.50	EtOH(300ml)	84	80	52	CH0000CH2

	TABLE 7 (Continued) Preparation of eta -acrylic acids and esters and amides thereof	TABLE	TABLE 7 (Continued)	des thereo			
Compound (2) R: X:	Oxidizing agent	Quantity of oxidizing agent in moles added to 0.30 moles of the Compound (2)	f ed les Solvent	Reaction period (hr.)	Reaction temp.	Yield (based on compound (2), (%)	1 1 Product
0 -Co(CH ₂ CH ₂ 0), H	NaľO,	0.33	MeOH(200ml)— H ₂ O(200ml)	24	25	73	O PhSCH=
	H, 0,	0.50	EtOH(300ml)	48	80	61	СНСОО(СН, СН,0), Н
0 	NaľO,	0.33	MeOH(200ml)— H ₂ O(200ml)	. 24	25	70	0 == #O
•	HO 000-(C)	0.33	CHCl, (300ml)		25	49	CHCOO(GH, CH, 0), Me
O CH, CH, OH	NaIO,	0.33	MeOH(200ml)— H ₂ O(200ml)	24	25	73	O PhSCH =
CH, CH, OH	HO 000-{O}	0.33	CHCI, (300ml)	-	25	75 (CHCON CH, CH, OH
						!	

TABLE 7 (Continued)

Preparation of etaacrylic acids and esters and amides thereof

Product	O
Yield Reaction Reaction (based on period temp. compound (hr.) (°C) (2), (%)	70 CH
Reaction temp.	08
Reaction period (hr.)	84
Solvent	меОН(200ml) — Н ₂ О(200ml)
Quantity of oxidizing agent in moles added to 0.30 mols of the Compound (2)	0.50
Oxidizing Agent	Н, О,
Compound (2)	O —CNHCH, CH, SO, Na
ä	

PER	RTIES OF eta -SUL PROPERTY	FINYL-ACRYLIC A	DPERTIES OF β-SULFINYL-ACRYLIC ACIDS AND ESTERS AND AMIDES THEREOF Result (NMR Found Fo	DES THEREOI Result	F of eler ind ind	Result of elementary analysis found calcd	y analysis calcd.
	i noi En i i	IN (Cill)	(CC14, 1MS, ppm)	(%)	(%) H	C (%) H (%) C (%)	M (%)
C ₁₂ H ₂₈ S-CH=CH-COOH	m.p. 62 – 65°C (from hexane)	3300 (OH)	7.25 (doublet, 1H, "CH-C00	62.4	7.3	62.5	4.5
		0 # 1690 (−CO−)	6.50 (doublet, 1H,				
		0 1050 (-S-)	0 				
0=	m.p.	0 1710 (-C-0-)	7.20 (doublet, 1H, -CH-COO-)	62.3	10.1	62.0	10.4
C ₁₂ H ₂₆ —S—CH= CH—COOCH,	55 – 53°C (from hexane)	0 = 0	11 TO 12 TO				
		1043 (-8-)	6.32 (doublet, 1H,				
			0 -S-CH=)				
HO HO O O		3300 (OH)					
C,1,H,1,8—S—CH-CH—COCH,2—CH—CH,	Liguid	0 1715 (-C-O-)	7.58 (doublet, 1H, = CH-C00-)	62.3	9.5	62.4	6.6
		0=					
		1050 (S)	5.60 (doublet, 1H,				
			-S-CH-)				
							0

TABLE 8 (cont.) P	PROPERTIES OF eta -s	ULFINYL-ACRYLIC	PROPERTIES OF $oldsymbol{eta}$ -SULFINYL-ACRYLIC ACIDS AND ESTERS AND AMIDES THEREOF	ES THERE	30F		
COMPOUND	PROPERTY	IR (cm ⁻¹)	NMR (CC1 ₄ , TMS, ppm)	Result of elementary analysis found calcd.	f eleme I I (%)	entary analys calcd. C (%) H (alysis d. H (%)
0-1	m.p. 33 – 35°C (from isopropyl alcohol)	3300 (OH) O	7.60 (doublet, 114, -CH -COO)	57.6	8.3	58.0	& & &
HO HO OH		1713 (-CO) 0 1035 (-S)	0 II 5.30 (doublet, 1H, -S-CH=)				
0=		3300 (OH) O	7.33 (doublet, 1H, -CH-COO-) 59.8		9.3	0.09	9.6
C ₁₂ H ₂₅ -S-CH-CH-CO(CH ₂ CH ₂ O) ₃ H	Liquid	1715 (-CO-) 0 0 1050 (-S-)	6.65 (doublet, 1H, _S_CH=)				
0 0 0 C,,H,, -S-CH-CH-CN(CH,CH,OH),	Liquid	3300 (OH)	6.95 (doublet, 1H, =CH-C00-) 59.5	59.5	9.6	8.09	10.0
		0 1050 (-S-)	0 5.36 (doublet, 1H, -S-CH=)			;	
	m.p.	0 1625 (- CN-)	6.80 (doublet, 1H, -CH-COO-) 50.3		7.6	50.6	8.0
O 0 II II C.1,2 H, 5,5 - S - CH - CH - CN + CH, SO, Na		0 1035 (-S) 1060 (-SO,Na)	5.90 (doublet, 1H, -S-CH- in CD, 0D				

TABLE 8: PROP	ERTIES OF eta -SULFII	NYL-ACRYLIC ACII	TABLE $8:$ PROPERTIES OF $oldsymbol{eta}$ -SULFINYL-ACRYLIC ACIDS AND ESTERS AND AMIDES THEREOF (cont.)	ereof (c	ont.)		,
COMPOUND	PROPERTY	IR (cm ⁻¹)	NMR (CCI,, TMS, ppm)	Result fou C (%)	ult of elem found b) H (%)	Result of elementary analysis found calcd. C (%) H (%) C (%) H (%)	calcd.
O 	Liquid	3300 (OH) 0 0	7.25 (doublet, 1H, -CH=COO-)	35.7	4.4	35.8	4.5
СН, SCH-СНСООН		1690 (-CO-) O 1050 (-S-)	0 \$5.50 (doublet, 1H, -S-CH-)				
CH,SCH=CHCOOCH,	Liquid	9 1713 (-CO-) 0	7.30 (doublet, 1H, -CH-COO-) 40.7	40.7	5.4	40.5	5.4
		1043 (—S—)					
noiso o		3300 (OH)	7.25 (doublet, 1H, "CH=C00-)	40.7	5.7	40.4	5.8
CH, SCH-CHCOCH, CHCH,	Liquid	1710 (-C-O-)	0 5.92 (doublet, 1H, -S-CH=)				
		1040 (—\$)					
·		3300 (ОН)	7.30 (doublet, 1H, -CH-COO-)	42.6	5.8	42.9	5.8
CH35CH-CHCOCH2 CH35CH-CHCOCH2 HO HO	Liquid	0 1715 (-C-O-) 1030 (-E-)	0 6.10 (doublet, 1H, -SCH-)				

TABLE 8: PROPE	TIES OF B-SULFIN	YL-ACRYLIC ACID	TABLE 8: PROPERTIES OF eta -SULFINYL-ACRYLIC ACIDS AND ESTERS AND AMIDES THEREOF (${f cont.}$)	REOF (cont.)		
COMPOUND	PROPERTY	IR (cm ⁻¹)	NMR (CCI ₄ , TMS, ppm)	Result of elementary analysis found calcd.	lementary %) C (%)	entary analysis calcd. C (%) H (%)
. 0=		3300 (OH) Q	7.11 (doublet, 1H, *CH-C00-)	45.3 6.7	45.1	8.9
CH,SCH=CHCO(CH,CH,0),H	Liquid	 1710 (-CO-)	0=			
		1040 (-8)	5.93 (doublet, 1H, -S-CH=)			
		3300 (OH)	7.21 (doublet, 1H, -CH-COO-)	43.8 6.7	43.4	8.9
CH,SCH-CHCN(CH,CH,OH),	Liquid	0 1650 (—CN—)	0			
		1045 (—S—)	5.93 (doublet, 1ft, -5-Cff*)			
0 0	d'il	0=	7,12 (doublet, 1H, "CH-COO-)	28.6 3.8	28.9	4.0
II II CH-CH-CH-CH, CH, SO, Na	110-111°C (from isopropyl alcohol)	1625 (–CN–) 0	0			
		1040 (-S-)	 6,20 (doublet, 1H, -S-CH=)			
		1225, 1050 (-S0 ₃ Na)	in CD,OD			
		3300 (OH)	7.25 (doublet, 1H, "CH-C00-)	69.1 11.1	0.69	11.1
H000JH07-HJ08 H J	m.p. 80 - 81°C (from hevene)	0	c			
230.410.012 010.001		Ö	 5.55 (doublet, 1H, -S-CH=)			
		1050 (—S—)	1			

1	IES OF β-SULFINYL	-ACRYLIC ACIDS	TIES OF β -SULFINYL-ACRYLIC ACIDS AND ESTERS AND AMIDES THEREOF (cont.)	REOF (ca	ont.)		
COMPOUND	PROPERTY	IR (cm ⁻¹)	NMR (CCi ₄ , TMS, ppm)	Result foun C (%)	of elemid c	Result of elementary analysis found calcd. C (%) H (%) C (%) H (%)	nalysis H (%)
		3300 (OH)	7.32 (doublet, 1H, -CH-C00-)	66.3	10.8	66.5	10.9
C,uI,SCII=CHN(CH,CH,OH),	m.p. 40-41°C (from hexane)	0 	0 6.11 (doublet, 1H, -S-CH=)				
		0 					
	d-m	0 	7.03 (doublet, 1H, =CH=COO-)	58.4	9.3	58.3	9.3
C, H, SCH-CHCNHCH, CH, SO, Na	130-131°C (from isopropyl. alcohol)	0 1035 (-\$-)	0 				
	1225,	1225, 1050 (-SO ₃ Na)	in CD ₁ OD				
	m.p.	3300 (OH) 0	7.30 (doublet, 1H, -CH-COO-)	68.2	10.3	68.1	10.3
С,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	(from hexane)	1680 (-CO-)	5.56 (doublet, 1H, -S-CH=)				
		1040 (-5-)					
C, H, SCH-CHCOOCH,	m.p. 73–74°C (from hexane)	1710 (-C-0-)	7.12 (doublet, 1H, =CH-COO-)	68.9	10.5	68.7	10.5
		1043 (-S-)	 6.24 (doublet, 1H,S-CH=)				

TABLE 8: PROPEF	TIES OF eta -sulfin	YL-ACRYLIC ACIDS	TABLE 8: PROPERTIES OF eta -SULFINYL-ACRYLIC ACIDS AND ESTERS AND AMIDES THEREOF (cont.)	REOF (co	nt.)		
COMPOUND	PROPERTY	IR (cm ⁻¹)	NMR (CCI,, TMS, ppm)	Result of elen found C (%) H (%)	of elem und H (%)	Result of elementary analysis found calcd.	ntary analysis calcd. C (%) H (%)
ноно о	m.p.	3300 (OH)	7,11 (doublet, 1H, -CH-COO-)	64.9	10.2	64.8	10.0
C,,H,,SCH-CHCOOCH,CHCH,	(from hexane)	1710 (-C00-)	0=				
		II 1040 (-S-)	5.75 (doublet, 1H, -S-CH-)				
		3300 (OH)	1 300 HO 111 1-11-17 00 F		}	,	
C _H H ₂₅ ScH=cHc00CH ₂ T ⁻⁰	m.p. 55–56°C	1715 (<u>-</u> C00-)	7.30 (doublet, 1H, -CH-COO-) 0 0	8./9	9.6	67.7	7.6
\$ \$	(Holl Revence)	1020 (—S—)	6.11 (doublet, 1H, -S-CH-)				
0=	m.p.	3300 (OH)	7 35 (domblet 10 _ CU 000)	6.43		3	
С,, н,, SCH-СНСОО(СН, СН, О), Н	(from hexane)	1710(-C00-)	(25) (aouoiet, 111, =Cn=COO=)	04.	1:01	04.0	10.0
		1040 (—S—)	5.98 (doublet, 1H, -S-CH*)				
	m•p•	3300 (OH) 0	7.21 (doublet, 1H, -CH-COO-)	70.8	4.2	70.3	4.0
C19 13 5 CH = CH CN (CH, CH, OH),	(from hexane)	1640 (-CN-)	○ ≈				
		1030 (-S-)	6.03 (doublet, 1H, -S-CH=)		•		
0==	m.p. 121–122°C	1625 (-CON-) 0	7.22 (doublet, 1H, "CH"COO-)	56.6	8.3	56.9	8.6
C, H, SCH-CHCNHCH, CH, SO, Na	(isopropyl alcohol)	1038 (−S−)	5.93 (doublet, 1H;,-S-CH-)				
		1225, 1040 (-SO ₁ Na)	in CD,OD				3

F (cont.)
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TABLE 8: PROF	ERTIES OF A-SULFIN	YL-ACRYLIC ACID	TABLE 8: PROPERTIES OF eta -SULFINYL-ACRYLIC ACIDS AND ESTERS AND AMIDES THEREOF (${ t cont.}$)	(EOF (cont.)		
COMPOUND	PROPERTY	IR (cm =¹)	NMR (CCI ₄ , TMS, ppm)	Result of elementary analysi found calcd. C (%) H (%) C (%) H (%)	i ca ca %) C (%)	analysis calcd.
O Phsch-chcooh	m.p. 88—89°C (from hexane)	3300 (OH) 1690 (COO) 0 1035 (-S-)	7.30 (doublet, 1H, -CH-COO-) 0	55.3 4.2	55.1	4.1
O Phsch-chcooch,	m.p. 80–81°C (from hexane)	1710 (COO-) 0 1040 (-S-)	7.22 (doublet, 1H, =CH-COO-) 0	57.3 4.6	57.1	4.8
OOHOH PhSCH-CHCOOCH, CHCH,	liquid	3300 (OH) 1715 (-C00-) 0 1035 (-S-)	7.10 (doublet, 1H, =CH-COO-) 5.65 (doublet, 1H, -S-CH=)	53.4 5.2	53.3	25.
HO HO OH -H25-W-	liguid	3300 (OH) 1710 (-COO-) 0 1030 (-S-)	7.25 (doublet, 1H, -CH-COO-) 0 6.01 (doublet, 1H, -S-CH=)	59.8 5.30	0 52.6	5,30
0 Рь SCH-СНСОО(СН, СН, О), Н	liq vi d	3300 (OH) 1710 (-COO-) 0 1038 (-S-)	7.30 (doublet, 1H, -CH-COO-) 0 5.88 (doublet, 1H, -S-CH-)	54.6 6.1	54.9	6.1
						3

TABLE 8: PROPERTIES OF β -SULFINYL-ACRYLIC ACIDS AND ESTERS AND AMIDES THEREOF (cont.)

COMPOUND	PROPERTY	IR (cm "1)	(CCI, TMS, ppm)	Result of elementary analysis found calcd. C (%) H (%) C (%) H (%)	ementa 5) C	ry analysi calcd. (%) H (%
0=		3300 (OH)	7.20 (doublet, 1H, =CH-COO-) 55.0 6.2 55.1	55.0 6.2	55.	1 6.1
PhSCH*CHCON(CH2CH2OH)2	Liquid	1635 (-CN-)	0=			
		0=	6.13 (doublet, 1H, -S-CH-)			
		1038 (-S-)		٠		
0=		1630 (-CON-)				
PhSCH—CHCONHCH, CH, SO, Na		0=	7.24 (doublet, 1H, -CH-COO-) 42.3	42.3 3.8	42.4	4 3.9
		1038 (-S-)	0=			
	-	1225, 1040 (-SO ₃ Na)	5.84 (doublet, 1H, -\$-CH=) in CD, OD			:

Example 6.

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This Example shows the antibiotic activities and the growth preventing effects of the compounds against gram positive and gram negative micro-organisms.

In accordance with the test method using agar culture media mixed with the compounds, the concentrations of the compounds of the present invention necessary for preventing growth of various organisms were determined.

I ml of a solution of each of the compounds having predetermined concentration as set forth in the following Tables was put on a Petri dish, and 19 ml of Sabouraud's agar culture medium preliminarily heated to a molten state was then added to and uniformly mixed with the above solution, and the mixture was allowed to cool and solidify. One platinum loop of a suspension containing one million cells of an organism per 1 ml was coated on the surface of the culture medium, and was cultivated for 72 hours in a thermostatic chamber maintained at 30°C. The state of growth of the organism on each culture medium after this cultivation was observed, and the minimum concentration of the respective compounds for preventing growth of the 9 15

organism on the culture medium was determined.

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The reference symbols appearing in the following Tables have the meanings set forth hereinbelow:

+: Growth was observed; a growth preventing effect was not exhibited.

±: Growth was observed to some extent; an appreciable growth preventing effect was observed.

-: Growth was not observed; a perfect growth preventing effect was exhibited.

	Organism Species	Staphy	Staphylococcus aureus	aureus	Bac	Bacillus subtilis	tilis
Compounds of the Invention	Concentration of compounds (PPM)	1000	200	100	1000	200	100
0 			!	ι	ı	i	+1
n-C,H, CON(CH, CH, OH),			+	+	,	+	+
Reference Compound							
HO COOM		ì	+	+	t	+	+
Reference Compound							
						,. ·	-
HO CO2C245			i	+	ı	+ 1	+
Reference Compound							

	Organism Species	Staphy	Staphylococcus aureus	aureus	Bac	Bacillus subtilis	tilis
Compounds of the Invention	Concentration of compounds (PPM)	200	100	20	200	100	20
0 n-C ₁₃ H ₂₈ -S-CH-CH-COOH		1	ı			1	ı
0 n-C,4,4,5°-S-CH-CH-COOCH,		ı	j	t.	1	ı	,
но — он		+	+	+	+	+	+
Reference Compound						:	
HO CO2C245		1	+	+	+1	+	+
Reference Compound							

Compounds of compounds (PPM) 500 100 50 5 n-C,H _g -S-CH-CH-COOCH ₃ cooka Reference Compound Reference Compound The first		Organism Species	Esche	Escherichia coli	ile	Prote	Proteus vulgaris	ris	Pseudom	Pseudomonsa aeruginosa	ginosa
t + + + + + + + + + + + + + + + + + + +	mpounds of .	Concentration of compounds (PPM)	200	100	20	200	100	50	200	100	50
	0 2,H ,-SCH-COOCH,		1	ŧ	ţ	ı	1	ı	1	+	+
	DONG OH		†	+	+	+	+	+	+	+	+
202-C2H5	ference Compound										
			++	+	+	ı	+	+	+	+	+
Reference Compound	ference Compound										

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	Organism Species	Esch	Escherichia coli	oli	Prote	Proteus vulgaris	ris	Pseudomonas aeruginosa	onas aer	uginosa
Compounds of the Invention	Concentration of compounds (PPM)	1000	200	100	1000	200	100	100 1000 500	200	100
NOOD COOM										
		+	+	+	+	+	+	+	+	+
Reference Compound										
5-F2-2-CO2-√-F2-PO		ı	. +1	+	ı	ı	+	+1	+	+
Reference Compound										

	Organism Species	Staphy! aureus	Staphylococcus aureus	ccus	B s	Bacillus subtilis	s	Esche coli	Escherichia coli		Proteus vulgaris	is	Pseudomonas aeruginosa	mona 10 sa	s
Compounds of the Invention	Concentration of compounds (PPM)	1000	200	100	1000	200	100	1000 5	00 10	00 1	1000 500 100 1000 500 100 1000 500 100 1	100	1000 5	00	00
HO COOM			+	+	ı	+	+	+1	+		+:	+	+	+	+
Reference Compound															
							·	1				٦	•		-
HO-CO2C2415		t	1	+	i	+1	٠	J	⊢ I			•	•!	-	<u>-</u>
Reference Compound						İ									١
					1										

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···					337,223				
nas	50	+	+	+	+	+	+	+	+
Pseudomonas aeruginosa	100		++	+	+	+	+	+	+
Pseu	900		1			+1	+1	+	+
w w	80	+	+	+	t	,	,	+	+
Proteus vulgaris	100	+	+	+				+	+
D. 5	200	+	+1						ı
i a	20	+	+	+	,	+	+	+	+
Escherichia coli	100	+	+	+	1	+	+	+	+
Esc	200	+	+1		1	ı	1	+1	+1
S 50	82	+	+	+		l	ı	1	ι
Bacillus subtilis	100	+	+	+	ı	ı	,	ı	1
· ·	200	+	+1	ı	i	1	í	1	ı
ccus	50	+	+	+	t ;		1	ı	ı
Staphy lococcus aureus	8	+	+	+	ı	t	1	. 1	ı
Stap	200	+	+1	4	ı	ŧ	i	ı	1.
Organism Species	Concentration of compounds (PPM)								
	Compounds of the Invention	O II CH,-S-CH-CH-COOCH,	D-C,H,-S-CH-CH-COOCH,	0 n-C,H,-S-CH-CH-COOCH,	0 n-C ₄ H _g -S-CH-CH-COOCH ₃	0 n-C,H,,-S-CH~CH -C00CH,	0 n-C ₆ H ₁₁ -S-CH-CH-COOCH ₁	0 п-С _в н,,-S-Сн-СН-СООСН,	n-C ₁₀ H ₂₁ – S–CH-CH-COOCH,

Compounds of Concentration of Concentrat		Organism Species	Stapl	Staphy lococcus aureus		Bacillus subtilis	s .	Esch coli	Escherichia coli	8	9. 2	Proteus vulgaris		Pseu	Pseudomonas aeruginosa	as
	Compounds of the Invention	Concentration of compounds (PPM)	4		200	81	50		100	50	200	100	50	200	100	50
+ +	0 		i		ı		,		+1	+	+1	+	+	+	+	+
+ +	n-C,4H,g-S-CH-CH-COOCH,		ı		,	ι	t	+	+	+	+	+	+	+	+	+
+ + + + + + + + + + + + + + + + + + + + + + + + 1 + + 1 + + 1 + + 1 + 1	0 		l		,	,	t	+	+	+	+	+	+	+	+	+
+ + + + + + + + + + + + + + + + + + +	0 n-C _{1,} H ₃ ,−S-CH-CH-COOCH ₃		ı		1	ı	+	+	+	+	+	+	+	+	+	+
+ + + + + + + + + + + + + + + + + + +	HO HO		+		+	+	+	+	+	÷	+	+	+	• •	+	+
+ + + + + + + + + + + + + + + + + + +	Reference Compound			:												
Reference Compound	💜		1		+1	+	+	+1	· +	+	ı	+	+	+	+	+
	Reference Compound															

	Organism Species	Stay	phy loc	Staphylococcus aureus	1	Bacillus subtilis		Escl	Escherichia coli	'a	a. 5	Proteus vulgaris	s s	Pse	Pseudomonas aeruginosa	nas	,
Compounds of the Invention	Concentration of compounds (PPM)	200	100	20	200	100	20	500 100		50	200	100	50	200	100	50	
0 n-C,H,-S-CH-COOH			+	+	1	+	+	+	+	+	+	+	+	+	+	+	
o 		ι .	+	+	1	+	+	+	+	+	+	4	+	+	+	+	
0 n-C ₄ H _g -S-CH-CH-COOCH ₁		ı	ι	t	1	ı	ı	t	1	ī	3	1	1	ı	+	+	
0 n-C,H,-S-CH-CH COO(CH,CH,O),CH	,cH,		ı	i	í	ŧ	i i	ı	+	+	i	i	+	+	+	+	1,227,62
0 0H C,H 5-S-CH=CH-COOCH2CHCH3OH	НО	ı	l	ŀ	,	t	. 1	t	ı	+	1	1	+	+1	+	+	
n-C4H9-5-CH-CH-COO-CH2 OH		ı	ι	ı	t	ı	ı	ŧ.	+1	+	ı	+1	+	+	+	+	
0 n-C ₄ H ₉ -S-CH - CH-C00(CH ₂ CH ₄ O) ₁₀ H	. H ^o i	ı	1	,	ı	ı	ı	,	1	+	ι	+ :	+	+1	+	+	
							i										

,	Organism Species	Staphyl	Staphylococcus aureus		Bacillus subtilis	,,	Esch	Escherichia coli	es	Pro	Proteus vulgaris	G ë	Pseudomonas aeruginosa	mona
Compounds of the Invention	Concentration of compounds (PPM)	500 100	00 00	200	100	50	500 100		50 5	500 100		50 50	500 100	00 00
о-с ₄ 4y-5-сн=сн-соосн ₂ год о сн ₅ -сн ₃		ı	ı	l	ı	1	. 1	+	+	ı	+	+	+	
·		+	+	+	+	+	+	+	+	+	+	+	+	+
Reference Compound					-									
но-Со _р сгия Reference Compound		ı	+	- 1	+	+	+1	+	+	ı	+	+	+	

	Organism Species:	Staphyl aureus	Staphylococcus aureus	ccus	Bacillus subtilis	lus is	Esc coli	Escherichia coli	ia	Pro vul	Proteus vulgaris		Pseudomonas aeruginosa	nonas osa	
İ	Concentration of compound (ppm)	1000 500		1000	1000 500	100	1000	200	100	1000 5	500 1	100	1000 500	0 100	۰.
n-C,H, S-CH-CH-CON(CH,CH,OH),	2	,	1	,	1	,	ı	+1	+			+	+	+	
n-C,H1,-S-CH-CHCON(CH2CH2OH),		;	1	1	1	+1	'	+	+	1		+	+	+	1
n-C,H,,-S-CH-CHCON(CH,CH,OH),				1	ı	+	i	+	+	+1	+	+	+	+	1
n-C ₁₀ H ₂₁ -S-CH-CH-CON(CH ₂ CH ₂ OH) ₂	D ₂	1	'	1	+	+	+1	+	+	+	+	+	+	+	
n-C ₁₁ H ₃₁ -S-CH-CHCON(CH ₂ CH ₂ OH) ₂		١	,	,	l I	ı		+	+	1	+	+	+	+	57,225 I
n-C,4H, 5-S-CH=CHCON(CH,CH,0H),		1		+		+ .	+	+	+	+	}	+	<u> </u>	. +	1
0 	_		+	+	+	+	+	+	+	+		1	+	+	1
		'	+	ı	+1	+	+1	+	+	+1	+		+	+	1
			1			ı	ı	+:	+	+'	+		+	+	
												İ			48

	Organism Species:	Staphy aureus	Staphylococcus aureus		Bacillus subtilis		Escherichia coli	chia		Proteus vulgaris	S	Pseudomon aeruginosa	Pseudomonas aeruginosa	SE
Compounds	Concentration of compound (ppm)	1000 500	001 00	1000	200	188	1000 500	0 100	ĺ	1000 500	100	1000 500		100
n-C,H,-SCH-CH-CONH,		1	+	t	1	+	1	+	i	+	+	++	+	+
n-C,H,-S-CH-CH-CON		1	l	ı		1	. 1	+	T	i	+1	ł	+	
n-C,H,-S-CH-CH-CON(CH,CH,OH),	(H) ₂	1	·	1	í	,	+1	+	1	١	+		+	+
n-C,H,,-S-CH-CH-CON(CH,CH,OH),	OH),	l I	1	t	ı	+	+	+	+1	+	+	+	+	+
n-C,H ,-S-CH=CH-CONHCH,CH,SO,Na	O,Na	i	+	ı	š	+	+	+	+	+	+	+	+	+
n-C ₁₁ H ₂₃ CON(CH ₂ CH ₂ OH) ₂ (Reference Compound)		1	+	1	+1	+	+	+	+	+ .	+	+	+	+
COOMA COOMA		ł	+	ı	. +	+	+1	+	+ i	+	+	+	+	+
(Reference Compound)														

P seudomonas aeruginosa	100	. +	i						
mor		•							
19.5	200	+							
Pseudomon aeruginosa	1000 500	+1							
" »	100	+							
roteus ulgari	200	,			•				
	1000	1			SI				левс 20
nia	100	+			vario	ntratio mediu liameto	th othersistance	pound pensio menta st. Th	for 5 days in a thermostatic cultivation period, the growth minimum concentrations of the of each organism were obtained
cherical i	200	+1			cts of	conce	theac ing Re No. Z	fic con a sus shyton ve yea	ther the the trations were o
Esc		-			ng effe easts.	rmined rgar cu of 9 c	f Test	specificop of Crichog	s in a perioc concent anism
ري ري د ري	100	+			eventi and v	redete aud's i dish	ly mis thod o fard (taining num le r or 7	5 day vation mum c ch org
Sacillu ubtilig	0 500	+1			wth p	ing a pabour	"Me" Stan	ly con	for culti minii of ea
	1	ι		1	7. he gro against	ds havial of S	and un of the lustrial	vidual ed one pergilli s whic	ltivatec of the ind the growth
nooco	1 ,	+		•	ample ts of t intion	npoun 19 n	lave, cedure se Inc	ia ind is coat m, As	e end rved, e
uphylo reus	00 500	t		1	Ex tresult ntinve	the cor le and state w	autoc al pro Japane	re med ere wa ritrinu ridida a	plates were cultivated After the end of the vere observed, and the for preventing growth of mpounds.
Str	10(ŧ			he tes prese	tch of ig Tab	in an plate. gener ed in	cultur Sw. the Pitturn of Car Car	on pla C. Al sts wer sary for
cies:	of (m		·		hows to the	n of egollowing	form a form a ith the rescrib	rraud's le belo Penicil	organisms on the cultivation plates were cultivated for 5 days in a thermostatic chamber maintained at 25°C. After the end of the cultivation period, the growth states of the fungi and yeasts were observed, and the minimum concentrations of the respective compounds necessary for preventing growth of each organism were obtained to determine the effects of the compounds.
m Spe	tration nd (pp	:			mple s	solution the ficated	en stel fied to ance w ing" p	Sabor le Tab res of suspe	the curained and and and and and and and and and an
rganis	ompou				s Exam nds acc	of a surth in arily h	solidii solidii accorda Mouldi	of the in the ig sports or a	maint the fu comp
0	0 5	:			Thi	set fo	d then In a In a	each : forth ntainin ophyte	organisms chamber 1 states of t respective to determi
					8				
						'n	10	15	70
			punod						
	ş	0 ₂ C2H5	Com						
	unodu	占	ferenc						
	Cor	40	8 8						
	Staphylococcus Bacillus Escherichia Proteus Organism Species: aureus subtilis coli vulgaris	Staphylococcus Bacillus Escherichia Proteus aureus subtilis coli vulgaris 1000 500 100 1000 500 100 1000 500 100 500 100 500	Staphylococcus Bacillus Escherichia Proteus Organism Species: aureus subtilis coli vulgaris Concentration of compound (ppm) 1000 500 100 1000 500 100 1000 500 5	Staphylococcus Bacillus Escherichia Proteus Organism Species: aureus subtilis coli vulgaris Concentration of compound (ppm) 1000 500 100 1000 500 100 1000 500 5	Staphylococcus Bacillus Escherichia Proteus Concentration of compound (ppm) 1000 500 100 1000 500 100 1000 500 100 1	Organism Species: Staphylococcus Bacillus Escherichia Proteus compound (ppm) 1000 500 100 1000 500 100 1000 500 100 1	Organism Species: Staphylococcus Bacillus Escherichia Proteus Concentration of compound (ppm) 1000 500 100 1000 500 100 1000 500 100 1	Organism Species: Staphylococcus	Organism Species: Staphylococcus Bacillus Escherichia Proteus Concentration of compound (ppm) 1000 500 100 1000 500 100 1000 500 100 1

	Organism Species	Pen citr	Penicillium citrinum	٠	Aspenise	Aspergillus niger		Trich	Trichophy ton mentagrophy tes	tes	Can	Candida albicans	
Compounds of the Invention	Concentration of compounds (PPM)	200	100	20	200	100	20	200	100	20	200	100	20
0 n-C ₁₁ H ₁₁ -S-CH-CH-COOCH,		+	+	+	+	+	+	ι	ı	+		ŧ	1
n-C,,H, 9-S-CH-CH-COOCH,		+	+	+	+	+	+	i	+1	+	1	1	+1
n-C,,H,,-S-CH-CH-COOCH,		+	+	+	+	. +	+	1	+	+	1	+	+
n-C,,H,,-S-CH-CH-COOCH,		+	+	+	+	+	+	1	+	+	+	+	+
Potassium sorbate		+	+	+	+	+	+'	1	+	+	+	+	+
(Reference Compound)													
Anhydrous sodium acetate		ı	+	+	+	+	+	i	+	+	ı	+	+
(Reference Compound)													

	Organism Species	Penicillium citrinum	F	Asper niger	Aspergillus niger		Tricho menta	Trichophyton mentagrophytes	les	Can	Candida albicans	
Compounds of the Invention	Concentration of compounds (PPM)	1000 500 100 1000 500 100 1000 500 100 1	100	1000	200	100	1000	200	100	1000	200	100
Potassium sorbate		++	+	+1	+	+		ı	+	+	+	+
(Reference Compound)												
Anhydrous sodium acetate		1	+	ı	+	+	,		+	ı		+
(Reference Compound)												

34					1,557	,225			54
	50	+	. 1	+	+	+	+	+	
Candida albicans	100	+:	1	+	+	+	+	+1	
Car	200	ı	•	ı	ı	+	+		
tes	50	+	1	1	ŧ	+	+	+	
Trichophyton mentagrophytes	100	+	ı	1	'	ı	+	i	
Trich menta	200	ı	-	ı	ı	t	1	1	
91	50	+	+	+	+	+	+	+	
Aspergillus niger	100	+	+	1	1	+	+	+	
As	200	+	1	1	I	l	ı	ı	
l _e	20	+	+	+	+	+	+	+	
Penicillium citrinum	100	+	+	+	1	+	+.	+	
Per	200	+	ı	ı	1	1	+1	ı	
Organism Species	Concentration of compounds (PPM)			H,					
	Compounds of the Invention	0 n-C,H p-S-CH=CH-COONa	n-C,H,~S_CH=CH−C00CH,	0 n-C,H,g-S-CH=CH-C00(CH,CH,0),CH,	n-C,H,-S-CH-CH-COOCH,CHCH,OH	лесно-5-сн-сло-сн2-го-6-го-6-го-6-го-6-го-6-го-6-го-го-го-го-го-го-го-го-го-го-го-го-го-	0 n-C ₄ H ₃ -S-CH-CH-COO(CH ₂ CH ₂ O), ₀ H	n-¢ ₄ h ₉ -S-cH=CH-COO-CH2	

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	50	+		+								
albicans	100	+		+								
alb	200	+		ı								
mentagrophytes	20	+		+		S	10			15	70	
mentagrophy tes	100	+		+		or tics, in- and	en- va-			r X ger etal	ned atic	
menta	200	ł		1		antisepi antisepi ream co vatives s	re conv al preser			oup, and an inte earth m R, is al	up obtai ic aliph	£-5_E
	8	+		+		ry agai es and and o preser imately	souring which a rention			aryl gr zero or kaline ve and	xy gro olyhydi	5-5-5
	8	+		+		activitervative lotion of the approxi	ce or tate, v se conv			orana misz anall	dalko ofapo	3-2450
niger	200	+		+		icrobial as prestical oil, n place	ium ace ium ace ploy tho			atoms, wherein li metal, as defin	ubstitute group	· L
	20	+		+		antim se used maceut used ii positior	oe used vus sod nat emp		CHX	carbon) _m H, v n alkal m is	roxyl-sı droxyl	0
шn	100	+		+		possess y can t d phar can be h com	can tinhydro		RSO_CH=CHX	to 20 cCH ₂ O CH ₂ O M is a	a hydr one hy	m d
citrinum	200	+				invention easts. The reams, an on. They ed in such	cular, they sate and a rt composi	formula:	RSO	having 1 —O(CH , wherein	ns, or (4) com from tha	5 - 5
Organism Species	Concentration of compounds (PPM)					The compounds of the invention possess antimicrobial activity against one or more of bacteria, fungi and yeasts. They can be used as preservatives and antiseptics in cosmetic oils, lotions and creams, and pharmaceutical oil, lotion and cream compositions for topical application. They can be used in place of the preservatives and antiseptics conventionally used in such compositions, at approximately the same	concentration levels. In particular, they can be used in place of sourion safetylates, ethyl paraben, potassium sorbate and anhydrous sodium acetate, which are conventional preservatives, in prior art compositions that employ those conventional preservatives.	WHAT WE CLAIM IS:— 1. A compound having the formula:		•		1-0CH ₂ CH CHOH CHOH
						8	10			15	70	
	Compounds of the Invention	Potassium sorbate	(Reference Compound)	Anhydrous sodium acetate	(Reference Compound)							

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5	or (5)—NR'R", wherein R' is selected from hydrogen, alkyl having 1 to 20 carbon atoms, and hydroxyalkyl having 2 to 6 carbon atoms, and R" is selected from hydrogen, alkyl having 1 to 20 carbon atoms, and substituted alkyl having 2 to 6 carbon atoms wherein the substituent is selected from hydroxyl and a sulfo group in the form of a salt (—SO ₃ M ₁ , wherein M ₁ is an alkali metal). 2. A compound according to Claim 1, wherein R is a straight-chain alkyl or alkenyl group having 3 to 18 carbon atoms. 3. A compound according to Claim 1, wherein Y is a hydroxyl group or OM where M is an alkali metal. 4. A compound according to Claim 1 or Claim 2, wherein Y is selected from alkoxy having one to 3 carbon atoms, alkoxyethoxy having one to 3 carbon atoms in the alkyl moiety, and —O(CH ₂ CH ₂ O) ₂ R', where R' is C ₁ to C ₃ alkyl,	5
	OH	
	—OCH₂—CH—CH₂OH,	
15	and —O(CH ₂ CH ₂ O) _m H (m=1 to 12). 5. A compound according to Claim 1 or Claim 2, wherein Y is —NR'NR". 6. A compound according to Claim 5, wherein R' is selected from hydrogen, alkyl having 1 to 3 carbon atoms, and hydroxyalkyl group having 2 or 3 carbon atoms, and R" is selected from hydrogen, alkyl having 1 to 3 carbon atoms, hydroxyalkyl having 2 or 3 carbon atoms, and substituted alkyl having 2 or 3 carbon atoms, hydroxyalkyl having 2 or 3 carbon atoms, and substituted alkyl having 2 or 3 carbon atoms.	15
20	alkyl having 2 or 3 carbon atoms, and substituted alkyl group having 2 or 3 carbon atoms and wherein the substituent is —SO ₃ M wherein M is an alkali metal. 7. A method of preparing a compound as claimed in Claim 1, which comprises oxidizing a starting compound having the formula:	20
	RS—CH—CHX,	
25	wherein X is as defined in claim 1, with an inorganic or organic peroxide. 8. A method according to Claim 7, wherein said inorganic or organic peroxide is hydrogen peroxide, sodium metaperiodate, m-chloro-perbenzoic acid, perbenzoic acid, or peracetic acid. 9. A method according to Claim 8, wherein 1.1 to 1.5 moles of said inorganic or organic peroxide is used per 1 mole of said starting compound.	25
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